

REMARKS

The applicants appreciate the Examiner's thorough examination of the application and request reexamination and reconsideration of the application in view of the preceding amendments and the following remarks.

CLAIMS REJECTED BASED ON MIYAGAWA ET AL. IN VIEW OF ELLIOT ET AL.

The Examiner rejects claims 1-2, 4-13, 17-20, 24-25, and 34-36 under 35 U.S.C. §103(a) as being unpatentable over Japanese Patent No. JP62U47482 to *Miyagawa et al.* in view of U.S. Pat. No. 5,814,156 to *Elliot et al.* The Examiner also rejects claim 3 under 35 U.S.C. §103(a) as being unpatentable over *Miyagawa et al.* in view of *Elliot et al.* and further in view of U.S. Pat. No. 4,624,330 to *Schmidt et al.* The Examiner further rejects claim 14 under 35 U.S.C. §103(a) as being unpatentable over *Miyagawa et al.* in view of *Elliot et al.* and further in view of U.S. Pat. No. 5,002,63 to *Giapis et al.* The Examiner also rejects claim 23 under 35 U.S.C. §103(a) as being unpatentable over *Miyagawa et al.* in view of *Elliot et al.* and further in view of U.S. Pat. No. 6,374,770 to *Lee et al.* The Examiner further rejects claim 26 under 35 U.S.C. §103(a) as being unpatentable over *Miyagawa et al.* in view of *Elliot et al.* and further in view of U.S. Pat. No. 6,090,458 to *Murakami et al.*

The applicants will discuss the allowability of the rejected claims below. The applicant will begin, however, with a discussion of new claims 38 and 39.

New claim 38 recites, among other things, a gas injection module inside the reaction chamber and a gas exhaust module inside the reaction chamber. With modules inside of the chamber, gases can be directed to the substrate surface rather than to the reaction chamber

volume in general. This results in less waste, less deposition of reaction products onto reaction surfaces, and other advantages. See e.g. the applicants' specification at page 2 through page 5, line 3.

In contrast, *Miyagawa et al.* does not disclose or teach the applicants' claimed modules at all, much less a gas injection module and a gas exhaust module inside of the reaction chamber. Instead, *Miyagawa et al.* teaches a gas inlet 4 and a gas outlet 5 which are merely openings into the chamber. Thus, *Miyagawa et al.* simply delivers gas to the chamber volume overall, with its consequent disadvantages.

New claim 38 further recites means for translating the beam forming module, the gas injection module, and the gas exhaust module together over the substrate surface for delivering the reactant gas and the beam at or near the substrate surface within the reaction chamber.

In addition to not teaching modules, *Miyagawa et al.* fails to teach or suggest a means for translating modules at all. In contrast, *Miyagawa et al.*'s laser emitting port 3, inlet 4 and outlet 5 do not move, and thus there is no means for translating these elements. Instead of moving these elements, *Miyagawa et al.* teaches that the bottom portion of the chamber includes a movable part 12. Also, *Miyagawa et al.* fails to teach or suggest modules moving together over the substrate, in contrast to the applicants' claim 38. By moving these elements together a confined reaction zone is created, thus avoiding the disadvantages associated with making virtually the entire chamber a reaction zone as noted above.

Accordingly, *Miyagawa et al.* does not teach or suggest each and every element of the applicants' claim 38, even in combination with the secondary reference *Elliot et al.*, and claim 38 is in condition for allowance.

New claim 39 recites, among other things, a movable beam forming module to transform a UV radiation source raw output into a beam and for projecting the beam through said UV window to a reaction zone, a movable gas injection module inside the chamber proximate the beam to deliver at least one reactant gas to the substrate surface at the reaction zone, and a movable gas exhaust module inside the chamber proximate the beam to remove reaction by-products and unreacted gas from the substrate surface at the reaction zone.

As noted in connection with the discussion of claim 38 above, *Miyagawa et al.* does not teach or suggest the claimed modules, or that they are inside the chamber. Additionally, *Miyagawa et al.* does not teach or suggest that the gas injection module or the gas exhaust module are proximate the beam as claimed in claim 39. Moreover, *Miyagawa et al.* does not teach or suggest that anything is movable but the lower portion 12 of the reaction chamber, i.e. the beam, the inlet and the outlet of *Miyagawa et al.* are fixed and not movable.

Accordingly, *Miyagawa et al.* does not teach or suggest each and every element of the applicants' claim 39, even in combination with the secondary reference *Elliot et al.*, and claim 39 is in condition for allowance.

The applicants' independent claims 1, 29, 34, and 35 recite, among other things, a gas exhaust module, inside of a reaction chamber, to remove reaction by-products and unreacted reactant gas from the substrate surface. In contrast, *Miyagawa et al.* teaches merely inlets and outlets into a chamber, which at best would remove exhaust gas from the chamber, not from the substrate surface. See e.g. applicants' gas exhaust nozzle 24 or module 116 as shown in Figs. 2 and 6-12 as compared to *Miyagawa et al.*'s inlet 4 and outlet 5.

The applicants' independent claim 36 recites, among other things, that the beam and

reactant gas form a reaction zone near the surface, that the reaction zone is movable relative to the reaction chamber and the substrate, and the gas exhaust module is movable with the reaction zone.

It is clear that even *Miyagawa et al.*'s exhaust port 5 is not movable with the reaction zone. As movable part 12 of *Miyagawa et al.* moves, exhaust port 5 does not move with it, in contrast to the applicants' gas exhaust module of claim 36, which moves with the reaction zone.

Accordingly, *Miyagawa et al.* does not teach or suggest each and every element of the applicants' independent claims 1, 29, and 34-36, even in combination with the secondary reference *Elliot et al.*, and independent claims 1, 29 and 34-36 are in condition for allowance. Claims 2-14, 16-20 and 23-27 depend from claim 1, and thus are also in condition for allowance for at least the foregoing reasons.

**CLAIMS REJECTED BASED ON *OKI ET AL.* IN VIEW OF
HAMA ET AL. AND *ELLIOT ET AL.***

The Examiner rejects claims 1-2, 4-13, 16-20, 24-25, 27, 29 and 34-37 under 35 U.S.C. §103(a) as being unpatentable over Japanese Patent No. JP07111246 to *Oki et al.* in view of Japanese Patent No. JP63153277 to *Hama* and *Elliot et al.* The Examiner also rejects claim 3 under 35 U.S.C. §103(a) as being unpatentable over *Oki et al.* in view of *Hama* and *Elliot et al.* and further in view of *Schmidt et al.* The Examiner also rejects claim 14 under 35 U.S.C. §103(a) as being unpatentable over *Oki et al.* in view of *Hama* and *Elliot et al.* and further in view of *Giapis et al.* The Examiner further rejects claim 23 under 35 U.S.C. §103(a) as being unpatentable over *Oki et al.* in view of *Hama* and *Elliot et al.* and

further in view of *Lee et al.* The Examiner further rejects claim 26 under 35 U.S.C. §103(a) as being unpatentable over *Oki et al.* in view of *Hama* and *Elliot et al.* and further in view of *Murakami et al.*

The applicants will discuss the allowability of the rejected claims below. As above in connection with the *Miyagawa et al.* and *Elliot et al.* references, however, the applicant will begin with a discussion of new claims 38 and 39.

As noted above, new claim 38 recites, among other things, a gas injection module inside the reaction chamber and a gas exhaust module inside the reaction chamber.

In contrast, *Oki et al.* teaches gas inlet 31 and gas exhaust port 32, in place in a concentric circle around a central glass nozzle 34 and the optical center or center light axis 1 at the center. See e.g. *Oki et al.* Fig. 4 and paragraph [0025]. Even assuming for argument (only) that the inlet and outlet ports are inside the chamber, *Oki et al.* does not teach modules inside the chamber.

Moreover, applicants' new claim 38 further recites means for translating the beam forming module, the gas injection module, and the gas exhaust module together over the substrate surface.

Oki et al. clearly teaches that inlet 31, outlets 32, optical system 10, and nozzle 34 remain fixed, and do not translate over the substrate surface, much less together, as shown by the *Oki et al.* figures. (Indeed, *Oki et al.* teaches instead an X-Y stage which moves loading base 37.)

The Examiner also cites *Hama et al.*, stating that *Hama et al.* teaches "it is known to move a beam and nozzle 6 across a stationary surface ... Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to alternately move the beam,

gas injection module, and the gas module of Oki as taught by Hama ...”

The applicants respectfully submit that the Examiner’s conclusions are not correct for at least the following reasons.

- (1) *Hama et al.* teaches only that the nozzle for the beam moves in the chamber, and does not teach or suggest that any other elements (such as a gas injection module or a gas exhaust module) can or should be moved also, nor does *Hama et al.* teach any way this could, would or should be done in *Hama et al.*’s system -- or *Oki et al.*’s system.
- (2) To combine *Oki et al.* and *Hama et al.* would destroy the primary purpose of each.

To introduce a moving laser nozzle into *Oki et al.* would defeat the primary purpose of *Oki et al.*’s inlet 31 and gas exhaust outlet port 32, which are positioned concentrically around the light axis 1 of the laser beam with the light axis at the center. Because *Oki et al.*’s nozzle and outlets do not move, it would not be possible to maintain the beam at their center if the beam were to move. Moreover, *Oki et al.* explicitly teaches an X-Y stage for moving the loading base 37, rather than a moving laser beam, in contrast to *Hama et al.*

Conversely, to move window 9 of *Hama et al.* such that the light path of the laser is vertical to the substrate 3 -- as taught by *Oki et al.* -- is completely contrary to introducing the beam from the side as taught by *Hama et al.* Moreover, *Hama et al.* explicitly teaches a fixed substrate susceptor 2, in contrast to *Oki et al.*’s moving X-Y stage.

- (3) The Examiner has engaged in improper hindsight analysis by analyzing the applicants’ claims then picking and choosing isolated disclosures to form rejections. The law prohibits the use of such hindsight analysis.

“One cannot use hindsight reconstruction to pick and choose among isolated

disclosures in the prior art to deprecate the claimed invention". See In re Fine, 837 F. 2d 1071, 1075, 5 USPQ 2d 1596, 1600 (Fed. Cir. 1988). There must be a reason or suggestion in the art for selecting the procedure used, other than the knowledge learned from the applicants' disclosure. See also In re Dow Chemical Company, 837 F.2d 469, 473, 5 USPQ 2d 1529, 1532 (Fed. Cir. 1989).

The Examiner's use of hindsight analysis is manifest from the rejections based on the combination the *Oki et al.* and *Hama et al.* references which have incompatible and even diametrically opposite teachings.

Accordingly, applicants' claim 38 is in condition for allowance over the combination of *Oki et al.* and *Hama et al.*, even in further combination with the *Elliot et al.* reference.

New claim 39 recites, among other things, a movable beam forming module to transform a UV radiation source raw output into a beam and for projecting the beam through said UV window to a reaction zone, a movable gas injection module inside the chamber proximate the beam to deliver at least one reactant gas to the substrate surface at the reaction zone, and a movable gas exhaust module inside the chamber proximate the beam to remove reaction by-products and unreacted gas from the substrate surface at the reaction zone.

Oki et al. teaches inlet 31 and gas exhaust outlet port 32, the latter concentrically in place around center light axis 1. It is clear that these elements as well as the optical system 10 are fixed in place, and are not movable, as discussed above. This is in contrast to the applicants' claim 39.

The addition of *Hama et al.* does not render the applicants' claim 39 obvious for at least the reasons above. *Hama et al.* does not teach or suggest either a gas injection module nor a gas exhaust module at all, or how, why or if such additional features could be

incorporated into the *Hama et al.* system or *Oki et al.*'s system, and much less moving modules. Moreover, it is improper to combine *Oki et al.* and *Hama et al.* because their teachings are diametrically opposite, and their combination can only be made using improper hindsight.

Accordingly, applicants' claim 39 is in condition for allowance over the combination of *Oki et al.* and *Hama et al.*, even in further combination with the *Elliot et al.* reference.

The applicants' independent claim 1 recites, among other things, that the gas injection module and the gas exhaust module are movable relative to the reaction chamber and the substrate surface. Independent claim 29 similarly recites gas injection module and gas exhaust module, and further recites that the reaction zone is movable relative to the reaction chamber and the substrate. While the applicants traverse the Examiner's assessment that *Oki et al.* teaches modules inside the chamber at all (but rather teaches only inlets and outlet ports), the Examiner admits that *Oki et al.* does not teach that the gas injection module and the gas exhaust module are movable relative to the reaction chamber and the substrate surface.

The Examiner thus cites *Hama et al.* as a secondary reference to fill this void in the teachings of *Oki et al.*, but *Oki et al.* and *Hama et al.* have diametrically opposite teachings, as discussed in more detail above. Thus, to combine them would destroy each of their functionalities, and could only be the result of improper hindsight analysis. Moreover, also as discussed above, *Hama et al.* teaches only that the nozzle for the beam moves in the chamber, and does not teach or suggest that any other elements (such as a gas injection module or a gas exhaust module) can or should be moved also, nor does *Hama et al.* teach any way this could, would or should be done in *Hama et al.*'s or *Oki et al.*'s system.

Accordingly, independent claims 1 and 29, and claims 2-14, 16-20, and 23-27 which depend directly or indirectly from claim 1, are in condition for allowance.

Independent claim 35 includes the recitation that the gas injection module and the beam are movable relative to the substrate surface and the chamber. The Examiner admits that *Oki et al.* fails to teach that the gas injection module is movable relative the reacion chamber, and for the reasons discussed above, the combination of *Oki et al.* and *Hama et al.* does not fill this void.

Independent claim 36 includes the recitation that the reaction zone is movable relative to the reaction chamber and the substrate and wherein the gas exhaust module is movable with the reaction zone. The Examiner admits that *Oki et al.* fails to teach that the gas exhaust module is movable relative the reacion chamber, and for the reasons discussed above, the combination of *Oki et al.* and *Hama et al.* does not fill this void.

Accordingly, independent claims 35 and 36 are in condition for allowance.

Independent claim 37 includes the recitation of a linear translation stage *Oki et al.* teaches fixed non-moving inlet and outlet ports and beam, and to that extent *Oki et al.* teaches away from applicants' claim 37. It is well established that "teaching away" by one reference is an important *indictum* of non-obviousness. See e.g. W.L. Gore & Assocs., Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303, 311 (Fed. Cir. 1983) (in considering claims under §103, "the district court erred ... in considering claims in less than their entireties, i.e., in disregarding disclosures in the references that diverge from and teach away from the invention at hand" (with emphasis added)).

Additionally, *Hama et al.* teaches only a nozzle for the beam is moved, and does not teach a gas injection module or a gas exhaust module at all, or how a gas injection module

would be moved if it were part of *Hama et al.*'s (or *Oki et al.*'s) system. Moreover, for the reasons discussed above, *Oki et al.* and *Hama et al.* are not properly combinable.

Accordingly, independent claims 37 is also in condition for allowance.

CONCLUSION

Accordingly, claims 1-14, 16-20, 23-27, 29, 34-37 and new claims 38-39 are in condition for allowance.

Each of Examiner's have been addressed and/or traversed. Early and favorable action is respectfully requested.

If for any reason this Response is found to be incomplete, or if at any time it appears that a telephone conference with counsel would help advance prosecution, please telephone the undersigned or his associates, collect in Waltham, Massachusetts at (781) 890-5678.

Respectfully submitted,



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